Clean EnergyEnvironment
STATE PARTNERSHIP

Chapter 1. Introduction and Background

Summary

Across the nation, states are developing and adopting a variety of clean energy policies and programs to meet energy, economic, and environmental goals. These efforts are significantly increasing end-use energy efficiency, production of renewable energy, and the efficiency of energy generation. They have resulted in substantial energy savings, improved air quality, reduced greenhouse gas emissions, improved reliability, and security of the electric grid. They have also enhanced economic development and created new jobs.

Clean energy policies and programs with which states now have considerable experience include:

- Providing sufficient energy efficiency program funding (through a variety of means) to capture significant portions of the cost-effective energy efficiency potential in the state.
- Developing utility incentives and removing disincentives to encourage greater utility investment in energy efficiency.
- Establishing state-level appliance efficiency standards for products and equipment.
- Establishing or updating residential and commercial building codes and improving building design and operation practices.
- Setting electricity portfolio requirements for energy efficiency, renewable energy, and combined heat and power (CHP) and other clean distributed resources.
- Developing electricity market rules that remove obstacles to advanced high-efficiency clean distributed generation (DG) systems, including CHP.
- Leading by example by promoting and investing in energy efficiency and renewable energy for state buildings and facilities, among other initiatives.

EPA's Clean Energy-Environment State Partnership Program

The **Clean Energy-Environment State Partnership Program** is a voluntary program designed to help states review and adopt available policies and programs that effectively integrate clean energy into a low-cost, clean, reliable energy system for the state. Clean energy includes energy efficiency and clean energy supply, which includes clean distributed generation (DG)[a].

States participating in the Clean Energy-Environment State Partnership Program will use the *Guide to Action* to develop a *Clean Energy-Environment State Action Plan* for using existing and new energy policies and programs to increase the use of clean energy.

The U.S. Environmental Protection Agency's (EPA's) ***Clean Energy-Environment Guide to Action*** identifies and describes 16 clean energy policies and strategies that are delivering economic and environmental results for states. These policies focus on opportunities for homes, public and private organizations, businesses, and electricity generation. While there are also opportunities for states to promote clean energy in the transportation sector, the *Guide to Action* does not currently include these policies. EPA is exploring the addition of these policies at a later date.

The *Guide to Action* helps state energy and environmental policymakers design and implement a clean energy plan that will:

- Save money by lowering energy demand and supply costs.
- Lower emissions of greenhouse gases and improve air quality.
- Reduce price volatility in energy markets.
- Enhance the reliability of the electric system.
- Avoid the need for new power plants and related fuel and supply infrastructure.
- Create economic development opportunities and new jobs.

[a] Throughout the *Guide to Action*, "clean DG" refers to non-centralized, usually small-scale, renewable energy and combined heat and power (CHP). "Clean energy supply" refers to renewable energy and CHP in both distributed and centralized applications.

The U.S. Environmental Protection Agency (EPA) has developed this *Clean Energy-Environment Guide to Action* to help states build upon this broad experience, evaluate a suite of clean energy options, and develop a *Clean Energy-Environment Action Plan* to outline the programs and policies that will increase their use of cost-effective clean energy. The *Guide to Action* describes 16 clean energy policies and strategies that states have used to meet their clean energy objectives. For each policy, the *Guide to Action* provides an overview of the benefits and details how states have successfully designed and implemented the policy.

The 16 clean energy policies focus on the role of demand- and supply-side resources (i.e., energy efficiency/renewable energy [EE/RE] and CHP) in providing clean, reliable, and affordable energy for homes, businesses, and public institutions. Clean energy also plays an important role in reducing emissions from the transportation sector. Examples of the types of clean energy transportation policies that states are implementing and resources for further information are shown in the box entitled *State Clean Energy Policies for Transportation* on page 1-3.

What Is Clean Energy?

Clean energy includes demand- and supply-side resources that deliver clean, reliable, and low-cost ways to meet energy demand and reduce peak electricity system loads. Clean energy resources include energy efficiency and clean energy supply, which includes renewable energy and CHP in distributed and centralized applications.

Energy efficiency reduces demand for energy and peak electricity system loads. Common energy efficiency measures include hundreds of technologies and processes for practically all end uses across all sectors of the economy.

Renewable energy is partially or entirely generated from non-fossil energy sources. Renewable energy definitions vary by state, but usually include solar, wind, geothermal, biomass, biogas, and low-impact hydroelectric power.

CHP, also known as cogeneration, is a clean, efficient approach to generating electric and thermal energy from a single fuel source.

For more information, visit EPA's Clean Energy Web site (http://www.epa.gov/cleanenergy) and the ENERGY STAR Web site (http://www.energystar.gov).

Why Clean Energy?

States are facing a number of environmental, public health, energy, and related challenges. Clean energy, where cost-effective, offers a way to meet these challenges, which continue to expand as energy demand continues to grow. The benefits of clean energy include:

- Reduced emissions of air pollution and greenhouse gases.
- Lower customer energy bills.
- Enhanced economic development and job creation.
- Improved reliability and security of the energy system.

A more detailed discussion of the challenges states are facing and how clean energy policies and programs can help address them follows.

Environmental and Public Health Challenges

Fossil fuel-based electricity generation is a major source of air pollutants and greenhouse gases, which pose serious risks to public health and the environment, as summarized as follows:

- *Fine-particle pollution* may raise the risk of heart attack and worsen respiratory disease in vulnerable people, leading to perhaps 60,000 premature deaths per year in the United States (Kaiser 2005).
- *Ground-level ozone* can cause a variety of health problems including aggravated asthma, reduced lung capacity, and increased susceptibility to respiratory illnesses such as pneumonia and bronchitis. It can also cause damage to plants and ecosystems, including reduced crop and forest yields and increased plant vulnerability to disease, pests, and harsh weather (EPA 2005b).

- *Greenhouse gases* are another byproduct of fossil fuel combustion. The levels of heat-trapping carbon dioxide (CO_2) in the atmosphere are expected to rise in the future as energy use and fossil fuel-based generation increase. States are concerned about how their economies, natural resources and ecosystems, water supplies, and public health could be affected by global climate change and are taking action to reduce their greenhouse gas emissions (Rabe 2004).

Figure 1.1a: Nonattainment Areas Ozone *(8-hour)*

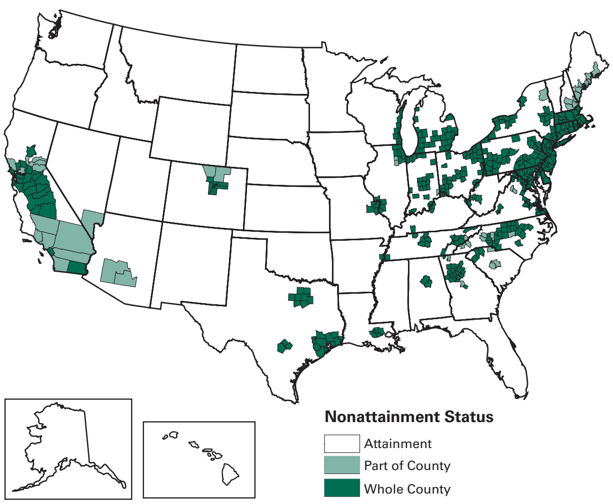
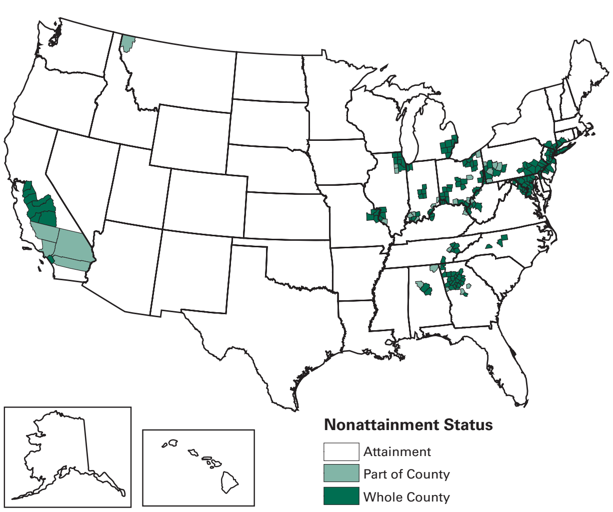


Figure 1.1b: Nonattainment Areas $PM_{2.5}$



Source: EPA 2005a.

Although emissions of sulfur dioxide (SO_2) and nitrogen oxide (NO_x) from power generation are declining, ground-level ozone exceeds federal standards for the protection of public health in many areas of the country. In April 2005, with the designation of non-attainment areas for ozone (8-hour) and fine particulate matter (PM) in effect, 134 million people were living in more than 470 counties where the air quality sometimes exceeds the federal 8-hour standard for ozone (see Figure 1.1a). Seventy-five million people were living in more than 200 counties that do not meet the PM2.5 standard (i.e., for PM that is 2.5 micrometers or smaller; see Figure 1.1b) (EPA 2005a). States with counties that are not in attainment with these standards need to develop and implement programs that reduce air pollution so that these areas meet federal air quality standards.

State Clean Energy Policies for Transportation

The *Clean Energy-Environment Guide to Action* focuses on clean energy opportunities for homes, businesses, and electricity generation. There are also many opportunities for states to promote clean energy in the transportation sector, which represents approximately one-third of U.S. energy consumption. In some states (e.g., California), transportation represents more than half of the state's total energy consumption. States are developing their own clean energy transportation policies and initiatives that are helping to improve air quality, save energy, and reduce dependence on imported energy sources. These policies and initiatives include setting minimum requirements for the use of biofuels, purchasing efficient vehicles for state fleets, and developing refueling infrastructure for alternative fuel vehicles (AFVs) (e.g., E-85 refueling stations).

For example, Minnesota's clean fuels program uses renewable fuels produced in Minnesota, such as ethanol and biodiesel, to reduce air pollution, promote economic development, and reduce dependence on imported energy supplies. The program is credited with helping the state achieve an acceptable level of ozone in every county (Minnesota Chamber of Commerce 2003).

For more information about EPA's voluntary transportation programs, visit the EPA Office of Transportation and Air Quality Planning's Voluntary Programs Web site (http://www.epa.gov/otaq/voluntary.htm).

Energy Challenges

States and the U.S. energy industry face multiple challenges in providing affordable, clean, and reliable energy in today's complex energy markets. These challenges include:

- *Electricity demand* continues to rise. Given current energy consumption and demographic trends, the U.S. Department of Energy (DOE) projects that U.S. energy consumption will increase by more than a third by the year 2025. Electric power consumption is expected to increase by almost 40%, and total fossil fuel use is projected to increase similarly (EIA 2005a). This growth in demand stresses current systems and requires substantial new investments in system expansions.
- *Energy reliability and security* is crucial. Recent events, such as the Northeast electricity blackout of August 2003, increased focus on the need for energy reliability and its economic and human welfare affects. These concerns, combined with the year-to-year uncertainty surrounding availability of hydro resources and continued public uncertainty about the safety of nuclear power and its waste products, represent risks for many of the current generation methods. In addition, owners of energy generation, transmission, and distribution assets, and all levels of government, are paying increased attention to the security risks surrounding our critical energy supply, transmission, and distribution infrastructure.
- *Transmission systems* are overburdened in some places, limiting the flow of economical generation and, in some cases, shrinking reserve margins of the electricity grid to inappropriately small levels. This can cause reliability problems and high electricity prices in or near congested areas.
- Many existing *base load generation* plants are aging. Significant retrofits are needed to ensure old generating units meet current and future emissions regulations.
- *Energy prices* are high. Higher natural gas prices increase energy costs for households and businesses and raise the financial risk associated with the development of new generation based on gas technologies, which had been expected to make up more than 60% of capacity additions over the next 20 years (EIA 2005a). Coal prices are also increasing and contributing to higher electricity costs.

Energy Savings Potential from State Clean Energy Actions

The potential energy savings achievable through state actions is significant. EPA estimates that if each state were to implement cost-effective clean energy-environment policies, the expected growth in demand for electricity could be cut in half by 2025, and more demand could be met through cleaner energy supply. This would mean annual savings of more than 900 billion kilowatt-hours (kWh) and $70 billion in energy costs by 2025, while preventing the need for more than 300 power plants and reducing greenhouse gas emissions by an amount equivalent to emissions from 80 million of today's vehicles.[a]

[a] This estimate is based upon EPA analysis of independent evaluations of the potential for cost-effective energy efficiency investments to help meet the nation's growing demand for energy and electricity. One of these independent evaluations is a 2004 meta-analysis that examined the results of 11 different studies that estimated the potential for energy efficiency in various states and regions in the country and for the United States as a whole (Nadel et al. 2004). This meta-analysis shows that the adoption of economically feasible and technically achievable, but as yet untapped, energy efficiency could yield a 24% savings in total electricity demand nationwide, which would result in a 50% or greater reduction in the growth in electricity demand by 2025.

Related Challenges

In addition to environmental and energy challenges, other challenges facing states include:

- Addressing concerns about energy prices and the ability of consumers, especially low-income households, to pay energy bills. Inability to pay energy bills has repercussions for individuals and the economy.
- Addressing economic development needs, particularly in rural areas and small communities.
- Educating the public about energy issues, including raising awareness about using energy wisely and the consequences of energy use, and motivating behavior changes.

Clean Energy Can Be a Big Part of the Solution

Recent state analyses have found that that there is potential for clean energy to cost-effectively meet much of the growth in energy demand expected over the next 10 to 20 years (Rufo and Coito 2002, Nadel et al. 2004, and Geller et al. 2005). Analyses have also shown that energy efficiency can be delivered through programs at a cost ($0.02–0.04/kWh) much less than new generation, offering a low-cost means of increasing the overall reliability of the system as both base load and peak load demand are reduced (Nadel and Geller 2001).

As an example, from 1975 through 2003 California's energy efficiency programs have saved 40,000 gigawatt-hours (GWh), 15% of the annual electricity use. California's recent energy efficiency programs continue to deliver efficiency at half the cost of base load generation (see Figures 1.2a and 1.2b) while having played a key role in mitigating the effects of the state's electricity crisis in 2001 (Wiser et al. 2004). The state's enhanced efforts to utilize energy efficiency as an in-state energy resource are expected to meet about half of the expected growth in electricity demand by 2013 through energy efficiency in addition to reduced demand for natural gas (CPUC 2004).

System reliability also benefits from clean energy strategies by reducing peak load demand, as the shrinking load and stress in the power distribution system decreases the likelihood of failure. For example, the demand-side management (DSM) program in Massachusetts has reduced peak demand by 7.2% and the price of peak power by 30% to 40% (NEDRI 2003).

Figure 1.2a: Energy Savings from California's Energy Efficiency Programs

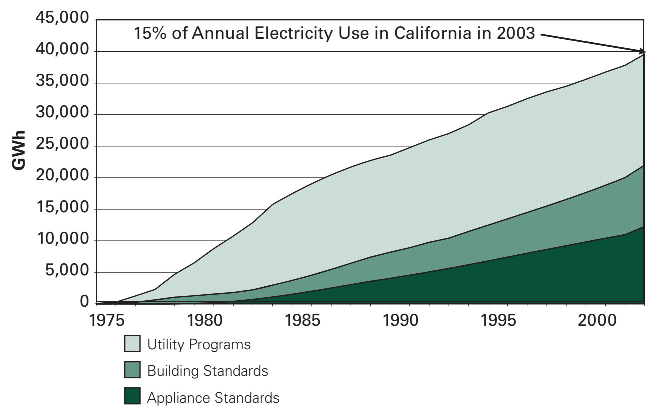
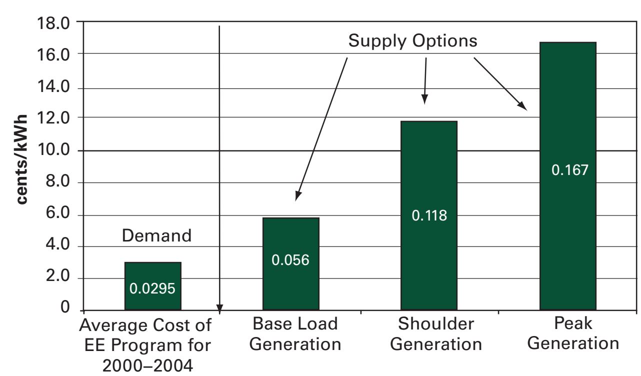


Figure 1.2b: Comparison of Energy Efficiency Program Costs to Supply Generation Costs
(2000 to 2004)



Sources: 1.2a: CEC 2003. 1.2b: CEC 2005.

- Addressing community opposition to siting new energy generation, transmission, and distribution facilities and concerns about environmental impacts of energy resource development (e.g., oil, gas, liquefied natural gas [LNG] terminals, and transmission lines).

How Does Clean Energy Address These Challenges?

States are finding that energy efficiency and clean energy supply, which includes renewable energy and clean DG technologies (e.g., CHP), can play an important role in helping meet their energy and environmental challenges. Clean energy can:

- *Reduce Energy-Related Air Emissions.* Using energy more efficiently through more efficient end uses, or through more efficient generation such as CHP, reduces the amount of fuel required for a given service or to produce a unit of energy output and reduces the corresponding emissions of pollutants and greenhouse gases. Electricity from renewable resources such as solar, geothermal, and wind technologies generally does not contribute to global climate change or local air pollution since no fuels are combusted in these processes.

- *Increase Power Reliability*. CHP and renewable energy, as DG, can reduce electricity infrastructure vulnerability, improve security of the electricity system, and reduce grid congestion. These technologies can be operated independently in the event of a disruption to central systems and targeted to load pockets to reduce grid congestion, potentially deferring or displacing more expensive transmission and distribution infrastructure investments. A 2005 study for the California Energy Commission (CEC) found that strategically sited DG yields improvements to grid system efficiency and provides additional reserve power, deferred costs, and other grid benefits (Evans 2005). Energy efficiency can also improve electric system reliability since energy efficiency reduces both base load and peak power requirements, thus decreasing the likelihood of system failure (Nadel and Geller 2001).
- *Increase Fuel Diversity*. Increased fuel diversity avoids over-reliance on a single fuel, which can cause disruption or price volatility if supply of that fuel is constrained. Renewable energy technologies broaden the energy mix. CHP can be fueled by a variety of fuels, including natural gas, coal, biomass, and biogas.
- *Provide More Efficient Use of Natural Resources*. Energy efficiency reduces demand for energy generation, which reduces the amount of fuel—coal, natural gas, or oil—needed to power our daily lives. CHP can provide much greater energy output for the amount of fuel used and renewable energy sources avoid the use of fossil fuels. Each of these clean energy sources also results in water savings through reduced water use and avoided thermal pollution.
- *Increase State Economic Development*. Investments in clean energy can promote economic development in a variety of ways. According to several studies, energy efficiency leads to energy bill savings, with re-spending of these savings supporting more jobs than if the energy were purchased (SWEEP 2002). Clean energy projects create short-term construction and installation jobs and provide numerous long-term opportunities associated with new clean energy businesses (Rabe 2004, Geller et al. 2005). EE/RE and CHP may help reduce fuel price volatility and increase fuel diversity, leading to a more stable energy supply portfolio (Wiser et al. 2005). Energy efficiency and renewable energy also draw on local resources that can offset imports from out-of-state. Use of these in-state resources improves the state balance of trade and can create long-term economic value.

Opportunities for State Action

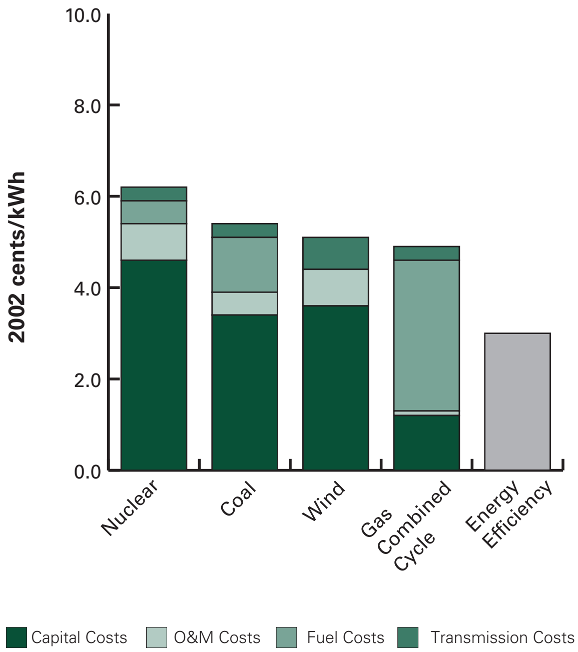
State policies and programs are successfully expanding the role of clean energy in the U.S. energy system. States are finding clean energy to be cost-competitive with traditional sources of generation, as demonstrated in Figure 1.3, which illustrates the comparative cost of electricity from a range of sources, including energy efficiency, under typical assumptions.

To help capture the cost savings and other benefits of clean energy, many states have implemented policies and programs to increase the use of clean energy alongside other sources. For example:

- Seventeen states and Washington, D.C. have adopted public benefits funds (PBFs) for energy efficiency that provide more than $1 billion annually to support cost-effective clean energy (ACEEE 2004b).
- Twenty-one states and Washington, D.C. have adopted renewable portfolio standards (RPS) to increase the amount of wind, solar, biomass, and other renewable resources in their energy portfolios. Existing RPS requirements are expected to result in the generation of more than 25,000 megawatts (MW) of new renewable energy by 2017—enough power for nearly 17 million homes (Wiser et al. 2004).

Nevertheless, there remain significant additional opportunities for states to implement policies and programs and spur greater investment in clean energy. This section provides an overview of opportunities for state action for each of the clean energy areas: energy efficiency, renewable energy, and CHP.

Figure 1.3: Clean Energy Is Competitive with Fossil Fuel and Nuclear Generation Technologies



Note: The costs for nuclear, coal, wind, and gas combined cycle are projections for the cost of producing energy from new plants in 2010. The cost for energy efficiency is a median figure based on recent reports of the cost of energy saved over a portfolio of programs in leading states.

Sources: ACEEE 2004, EIA 2004.

Energy Efficiency

States are finding that well-designed and administered energy efficiency programs can cost-effectively offset a significant portion of expected growth in energy demand.

Achievable savings range from 10% to 35% of electricity demand and up to 10% of natural gas demand (Nadel et al. 2004). For example, a recent study of Connecticut's energy efficiency potential found that there is significant potential in all sectors of the state and that the state could reduce both peak demand and electricity use by 13% between 2003 and 2012 at an average cost of 1.4 cents/kWh saved over the lifetime of the investment. In addition, capturing the achievable and cost-effective energy efficiency potential would generate $3 in benefits for each $1 invested—equivalent to net benefits of $1.8 billion (Schlegel 2004, Environment Northeast 2005).

Chapter 2, *Developing a Clean Energy-Environment Action Plan*, presents more information about state clean energy potential studies and links to individual state analyses. Other studies indicate similar levels of savings for California, the Northwest, the Northeast, and other locations. These potential studies build on more than a decade of experience showing that well-designed energy efficiency efforts cost less than traditional sources of generation, while offering a range of environmental and economic benefits that continue to accrue year after year. These programs are saving energy, on average, at a life cycle cost of about $0.03/kWh saved, which is 50% to 75% of the typical cost of new power sources and less than 50% of the average retail price of electricity (ACEEE 2004a, ACEEE 2004b, EIA 2005b).

As of 2003, about $1.4 billion is being spent annually on ratepayer-funded energy efficiency programs in the electricity sector nationwide to capture this energy efficiency potential (York and Kushler 2005). This funding is provided through PBF programs (see Section 4.2, *Public Benefits Funds for Energy Efficiency*) and programs developed as part of utility integrated resource plans (see Section 6.1, *Portfolio Management Strategies*). These programs are reducing electricity demand by about 0.8% to 1% per year in states with comprehensive energy efficiency programs, which will result in cumulative energy savings of 10% or more over the next decade (ACEEE 2004b).

There is an opportunity to provide greater funding to capture the cost-effective potential that remains in most states. Across the 50 states, 2003 spending on energy efficiency programs as a percentage of utility revenues averaged 0.5%. The top 10 states (shown in Table 1.1) are spending between 1% and 3% of utility revenues on energy efficiency (York and Kushler 2005). In many states, the level of energy efficiency spending is much less than what would be needed to capture a substantial portion of the economic and achievable potential over the next decade (Nadel et al. 2004).

Table 1.1: 2003 Energy Efficiency Spending As a Percentage of Utility Revenues

Top 10 States	Spending As a Percent of Annual Total Revenues
Vermont	3.0
Massachusetts	2.4
Washington	2.0
Rhode Island	1.9
New Hampshire	1.8
Oregon	1.7
Wisconsin	1.4
New Jersey	1.4
Montana	1.3
Iowa	1.2
U.S. Average	0.5

Source: York and Kushler 2005.

Clean Energy Supply Programs

Renewable Energy

Renewable energy is partially or entirely generated from non-fossil energy sources. Definitions of renewable energy vary by state but usually include wind, solar, biomass, and geothermal energy; some states also include low-impact or small hydro, biogas, waste-to-energy, and CHP.

Renewable energy technologies continue to experience rapid growth in the United States due to state activity and increased cost-competitiveness. As of 2004, 2,300 MW of new renewable energy capacity had been developed as a result of state requirements, with an additional 1,600 MW coming online to serve voluntary green power market demand (Bird and Swezey 2004).

Renewable technologies are experiencing market growth due to several drivers. First, the cost of renewable energy technologies is approaching competitiveness with fossil fuel-fired technologies in some regions. For example, depending on geographic location, wind energy technology can produce power at about \$0.04–\$0.06/kWh,[3] compared to the \$0.30/kWh it cost in the early 1980s (Bird and Swezey 2004). This compares favorably to an average cost of conventional natural gas combined cycle generation, which was about \$0.065/kWh in October 2005. Due to renewable energy's low or free fuel costs, it is also attractive in markets where fuel price volatility is increasing.

Wind and photovoltaic (PV) markets have experienced double-digit growth over the past decade, mainly as a result of the policies and benefits described above. In the United States, annual installations of renewable energy exceeded 800 MW in 2004 (excluding large hydroelectric power) and are expected to reach almost 4,000 MW per year by 2013. State RPS are spurring rapid growth in renewable energy installations in the United States, with RPS cited as the driving force behind the installation of approximately 47% of new wind capacity additions in the United States between 2001 and 2004 (Wiser 2005).

Combined Heat and Power

CHP, also known as cogeneration, is the simultaneous generation of electric and thermal energy from a common fuel source. CHP is not a specific technology, but an efficient application of technologies to meet an energy user's needs.

Typically, two-thirds of the energy in a conventional power plant is lost when the waste heat is not recovered. CHP captures and uses the waste heat to meet the thermal needs (e.g., process heat, space heating, cooling hot water) of commercial and industrial facilities. A CHP system is substantially more efficient than purchasing electricity from the grid and meeting thermal needs with a boiler or process heater. CHP systems achieve fuel use efficiencies that typically range between 60% and 75%, a significant improvement over the average efficiency of separate heat and power (EPA 2004). This improvement in efficiency is an effective pollution

[3] Based on the results of the Navigant Consulting, Inc. (NCI) proprietary Levelized Cost of Electricity (LCOE) Model. This number is based on a range of recent NCI LCOE runs for different types of financing and wind speeds. This cost excludes the production tax credit (PTC) but includes accelerated depreciation. Without accelerated depreciation, the range is \$0.04–0.07/kWh (Navigant 2003).

prevention strategy that reduces air pollutant emissions as well as fuel costs for a given energy output.

In 2004, approximately 80 gigawatts (GW) of CHP were operational in the United States, up from less than 10 GW in 1980 (EPA 2004). There is potential for additional CHP in a variety of applications, including district energy at universities and downtown areas, industrial scale CHP in many industry sectors, and in commercial buildings such as hotels and casinos.

The *Clean Energy-Environment Guide to Action*

EPA developed the *Clean Energy-Environment Guide to Action* to help states evaluate clean energy options and develop their own *Clean Energy-Environment Action Plans* for implementing cost-effective clean energy programs that meet their environmental, energy, and economic goals. The *Guide to Action*:

- Identifies and analyzes a suite of cost-effective state clean energy policies and describes best practices, potential models, key features, and examples of effective state implementation for each policy.
- Helps states understand the analytical tools and methods that can be used to estimate the environmental and economic benefits of their clean energy programs.
- Links states to relevant guidance and technical support resources.

The *Guide to Action* identifies and describes 16 clean energy policies and strategies that states have used to pursue cost-effective clean energy. These policies are categorized according to whether they involve state planning and incentives programs, energy efficiency actions, energy supply actions (i.e., renewable energy and CHP), or utility planning and incentive structures. Table 1.2 describes each policy and lists many of the more specific approaches that can be used to implement each type of policy.

Using the *Guide to Action*

The *Guide to Action* provides a menu of clean energy policies and programs with which states have considerable experience and success. When using the *Guide to Action:*

- Select from the menu of policies by reviewing Table 1.2 and the chapter introductions to identify policies that are most likely to meet state goals. The process for developing a state *Clean Energy-Environment Action Plan* is described in Chapter 2.
- Keep in mind that some of the policies described in the *Guide to Action* represent different paths to the same goal or can be used in combination to achieve a goal.
- Design clean energy programs by building upon the established models, examples, and action items described for each policy, rather than starting "from scratch."

The policies in the *Guide to Action* can be viewed as a menu of policies and programs with which states have significant experience. Some of these policies represent different paths to a goal or can be used in combination to achieve a goal. States can select the appropriate mix of policies to achieve their goals. For example, in its 2005 Climate Change Action Plan, Connecticut developed a coordinated package of 55 recommended actions that include appliance standards, building codes, government green power purchases, a production tax credit, an RPS, and other clean energy policies (see Chapter 2, *Developing a Clean Energy-Environment Action Plan*).

For each of the 16 policies, the *Guide to Action* provides the following information:

- The objectives and benefits of the policy.
- Examples of states that have implemented the policy.
- Responsibilities of key players at the state level, including typical roles of the main stakeholders.
- Opportunities to coordinate implementation with other federal and state policies, partnerships, and technical assistance resources.

- Best practices for policy design, implementation, and evaluation, including state examples.
- Action steps for states to take when adopting or modifying their clean energy policies, based on established state programs.
- Resources for additional information on individual state policies, legislation and regulations, and analytical tools and methods to quantify emission reductions and estimate energy and cost savings.

Table 1.2: Summary of Clean Energy Policies

Policy	Description	State Examples	Specific Approaches	*Guide* Section No.
State Planning and Incentive Structures				
Lead by Example	States lead by example by establishing programs that achieve substantial energy cost savings within their own operations, buildings, and fleets and demonstrate the feasibility and benefits of clean energy to the larger market.	CA, CO, IA, NH, NJ, NY, OR, TX	• Energy savings targets for public buildings. • Renewable and energy efficiency purchase commitments for state facilities. • State loan and incentive programs for public buildings. • Energy performance contracting. • Technical support and training. • State clean energy planning.	3.1
State and Regional Energy Planning	Energy planning at a state or regional level can be an effective means for ensuring that clean energy is considered and used as an energy resource to help states address their multiple energy, economic, and environmental goals.	CA, CT, NM, NY, OR, New England Governors' Conference (NEGC), Northwest Power and Conservation Council, Western Governors' Association (WGA), Western Interstate Energy Board (WIEB)	• Clean energy plan. • Clean energy included within a comprehensive state energy plan. • Planning conducted by energy providers.	3.2
Determining the Air Quality Benefits of Clean Energy	States estimate the emission reductions from their clean energy programs, incorporate those reductions into air quality programs, and evaluate and report the emission reduction benefits of their clean energy programs and policies.	LA (local), MD (local), TX, WI, Western Regional Air Partnership (WRAP)	• Incorporating clean energy into air quality plans and long-term utility planning requirements. • Developing set-asides for energy efficiency and renewable energy projects. • Tracking and reporting emission reductions.	3.3

(continued on next page)

Table 1.2: Summary of Clean Energy Policies *(continued)*

Policy	Description	State Examples	Specific Approaches	*Guide* Section No.
		State Planning and Incentive Structures *(continued)*		
Funding and Incentives	States implement a range of targeted funding and incentives strategies that encourage governments, businesses, and consumers to save energy through cost-effective clean energy investments. Between 20 and 30 states have revolving loan funds for energy efficiency, tax incentives for renewable energy, grants for renewable energy, or rebates for renewable energy.	CA, CO, IA, MT, NY, OR, TX, WA	• Revolving loan funds. • Energy performance contracting. • Tax incentives. • Grants, rebates, and generation incentives. • NO_x set-asides for energy efficiency and renewable energy projects. • Supplemental Environmental Projects (SEPs).	3.4
		Energy Efficiency Actions		
Energy Efficiency Portfolio Standards	Similar to Renewable Portfolio Standards (see Section 5.1), EEPS direct energy providers to meet a specific portion of their electricity demand through energy efficiency. Seven states have direct or indirect EEPS requirements.	CA, IL, NJ, NV, PA, TX	• Energy efficiency targets for energy providers as a percentage of load growth, base year sales, or fixed energy savings (e.g., kWh).	4.1
Public Benefits Funds for Energy Efficiency	PBFs for energy efficiency are pools of resources used by states to invest in energy efficiency programs and projects and are typically created by levying a small charge on customers' electricity bills. Seventeen states and Washington, D.C. have established PBFs for energy efficiency.	CA, NY, OR, WI	• Funds for efficiency programs based on a system-wide charge (mills per kWh). • Grants, rebates, and loans. • Technical assistance, education, and training support for energy efficiency investments.	4.2
Building Codes for Energy Efficiency	Building energy codes establish energy standards for residential and commercial buildings, thereby setting a minimum level of energy efficiency and locking in future energy savings at the time of new construction or renovation. More than 40 states have implemented some level of building codes for residential buildings and/or commercial buildings.	AZ, CA, OR, TX, WA	• Minimum energy efficiency requirements for residential and commercial buildings. • Periodic review and updates to existing codes. • Code implementation, evaluation, and compliance assistance.	4.3
State Appliance Efficiency Standards	State appliance efficiency standards set minimum energy efficiency standards for equipment and appliances that are not covered by federal efficiency standards. Ten states have adopted appliance standards.	CA, CT, NJ, NY	• Minimum energy efficiency levels for consumer products and commercial equipment. • Periodic evaluation and review of standards, markets, and product applications.	4.4

(continued on next page)

Table 1.2: Summary of Clean Energy Policies *(continued)*

Policy	Description	State Examples	Specific Approaches	*Guide* Section No.
		Energy Supply Actions		
Renewable Portfolio Standards	RPS establish requirements for electric utilities and other retail electric providers to serve a specified percentage or amount of customer load with eligible resources. Twenty-one states and Washington, D.C. have adopted RPS.	AZ, CA, MA, TX, WI	• Promoting specified technologies through "technology tiers" and "credit multipliers." • Alternative compliance payments. • Renewable Energy Certificates (RECs) trading.	5.1
Public Benefits Funds for State Clean Energy Supply Programs	PBFs are a pool of resources used by states to invest in clean energy supply projects and are typically created by levying a small charge on customers' electricity bills. Sixteen states have established PBFs for clean energy supply.	CA, CT, MA, NJ, NY, OH	• Funds for emerging and commercially competitive technologies and clean energy market development programs based on a system-wide charge (mills per kWh). • Grants, rebates, and generation incentives.	5.2
Output-Based Environmental Regulations to Support Clean Energy Supply	Output-based environmental regulations establish emissions limits per unit of productive energy output of a process (i.e., electricity, thermal energy, or shaft power), with the goal of encouraging fuel conversion efficiency and renewable energy as air pollution control measures. Twelve states have established output-based environmental regulations.	CT, IN, MA, TX	• Conventional emission limits using an output formula. • Special regulations for small distributed generators that are output based. • Output-based allowance allocation methods in a cap and trade program. • Output-based allowance allocation set-asides for energy efficiency and renewable energy. • Multi-pollutant emission regulations using an output-based format.	5.3
Interconnection Standards	Standard interconnection rules establish processes and technical requirements that apply to utilities within the state and reduce uncertainty and delays that clean DG systems can encounter when obtaining electric grid connection. Fourteen states have standard interconnection rules, and 39 states offer net metering.	MA, NJ, NY, TX	• Standard interconnection rules for DG systems through defined application processes and technical requirements. • Net metering, which defines application processes and technical requirements, typically for smaller projects.	5.4

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Table 1.2: Summary of Clean Energy Policies *(continued)*

Policy	Description	State Examples	Specific Approaches	*Guide* Section No.
Utility Planning and Incentive Structures				
Fostering Green Power Markets	States play a key role in fostering the development of voluntary green power markets that deliver cost-competitive, environmentally beneficial renewable energy resources by giving customers the opportunity to purchase clean energy. Green power is available in more than 40 states.	CT, MA, NJ, NM, WA	• Customer access to green power markets. • Green pricing tariffs. • Green "check-off" programs. • Net metering.	5.5
Portfolio Management Strategies	Portfolio management strategies include energy resource planning approaches that place a broad array of supply and demand options on a level playing field when comparing and evaluating them in terms of their ability to meet projected energy demand and manage uncertainty.	CA, CT, IA, MT, NV, OR, PA, VT, Idaho Power, Northwest Power and Conservation Council, PacifiCorp, Puget Sound Energy	• Energy resource planning and procurement. • Integrated resource planning (IRP). • Retail choice portfolio management.	6.1
Utility Incentives for Demand-Side Resources	A number of approaches—including decoupling and performance incentives—remove disincentives for utilities to consider energy efficiency and clean DG equally with traditional electricity generation investments when making electricity market resource planning decisions.	AZ, CA, CT, ID, MA, MD, ME, MN, NY, NM, NV, OR, WA	• Decoupling utility profits from sales volume. • Program cost recovery. • Shareholder performance incentives.	6.2
Emerging Approaches: Removing Unintended Utility Rate Barriers to Distributed Generation	Electric and natural gas rates, set by Public Utility Commissions (PUCs), can be designed to support clean DG projects and avoid unintended barriers, while also providing appropriate cost recovery for utility services on which consumers depend.	*Exit Fees:* CA, IL, MA *Standby Rates:* CA, NY *Gas Rates:* NY	• Utility ratemaking and revenue requirements. • Revised standby rate structures. • Exit fee exemptions. • Natural gas rates for DG and/or CHP. • In regulated markets, help generators and utilities establish appropriate buyback rates.	6.3

Who Will Use the *Guide to Action*?

The *Guide to Action* is intended for use by state energy, economic, and environmental policymakers. It demonstrates a range of clean energy policy options, best practices, and lessons learned that can inform decisionmaking and policy design.

States participating in the Clean Energy-Environment State Partnership Program will use the *Guide to Action* to:

- Develop their own *Clean Energy-Environment Action Plan* that is appropriate to their state.
- Build on established models and practices adopted by other states.
- Identify the roles and responsibilities of key decisionmakers, such as environmental regulators, state legislatures, public utility commissioners, and state energy offices.
- Access and apply technical assistance resources, models, and tools available for state-specific analyses and program implementation.
- Learn from each other as they develop their own clean energy programs and policies.

States that have not yet developed comprehensive clean energy policies can begin by familiarizing themselves with the material in the *Guide to Action* and contacting EPA for guidance and referral to other resources. For states that are interested in adopting new clean energy policies, the *Guide to Action* provides a proven set of effective policies that draw upon the experiences, insights, and approaches that have been vetted and refined by other states.

Contents of the *Guide to Action*

The *Guide to Action* contains the following chapters and appendices:

- *Executive Summary*, provides a summary of the *Guide to Action*, tailored for state decisionmakers and others who want a concise description of the *Guide's* key findings and recommendations.
- *Chapter 1, Introduction and Background*, defines the term clean energy; describes the environmental, public health, energy, and other challenges that clean energy can address; and summarizes state opportunities for implementing clean energy policies. A summary of the 16 clean energy policies is also presented.
- *Chapter 2, Developing a Clean Energy-Environment Action Plan*, provides information about the steps states have used to develop a *Clean Energy-Environment Action Plan*, including establishing a collaborative process, setting goals, identifying policies and analyzing their impacts, and developing an implementation strategy. It also provides examples of state plans and an overview of the analytical tools and resources available to help states select and evaluate their clean energy options.
- *Chapter 3, State Planning and Incentive Structures*, describes four policies that states have used to help shape their clean energy strategy, quantify and integrate the environmental benefits of clean energy with other programs, and encourage other organizations in the state to invest in clean energy.
- *Chapter 4, Energy Efficiency Actions*, describes four policies that states have used to support greater investment in, and adoption of, energy efficiency through cost-effective programs.
- *Chapter 5, Energy Supply Actions*, describes five policies and emerging approaches that support greater investment in clean energy supply resources, including renewable energy and CHP.
- *Chapter 6, Utility Planning and Incentive Structures*, describes three utility-based policies that remove disincentives for utilities to consider energy efficiency, renewable energy, and clean DG equally with traditional electricity generation investments.
- Technical Appendices include:
  - *Appendix A, Federal Clean Energy Programs*
  - *Appendix B, Energy Efficiency Program Resources*
  - *Appendix C, Clean Energy Supply: Technologies, Markets, and Programs*

Information Resources

Federal Partnerships

As states pursue policies and programs for promoting clean energy, they can work with a variety of federal programs for assistance as described in Appendix A, *Federal Clean Energy Programs.*

For More Information About the *Guide to Action*

To download the *Guide to Action*, visit EPA's Clean Energy Web site at: http://www.epa.gov/cleanenergy/stateandlocal/.

To order a print copy of the *Guide to Action*, visit the National Service Center for Environmental Publications (NSCEP) Web site at: http://www.epa.gov/ncepihom/ordering.htm or contact NSCEP at: 1-800-490-9198.

Request EPA Publication #430-R-06-001.

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References

Title/Description	URL Address
ACEEE. 2004a. A Federal System Benefits Fund: Assisting States to Establish Energy Efficiency and Other System Benefit Programs. American Council for an Energy-Efficient Economy (ACEEE), Washington, D.C.	http://www.aceee.org/energy/pbf.htm
ACEEE. 2004b. Five Years In: An Examination of the First Half-Decade of Public Benefits Energy Efficiency Policies. Report # U041. ACEEE, Washington, D.C. April.	http://www.aceee.org/pubs/u041.htm
Bird, L. and B. Swezey. 2004. Green Power Marketing in the United States: A Status Report. Seventh Edition. NREL/TP-620-36823. National Renewable Energy Laboratory (NREL), Golden, CO. September.	http://www.eere.energy.gov/greenpower/pdfs/36823.pdf
Bird, L., B. Parsons, T. Gagliano, M. Brown, R. Wiser, and M. Bolinger. 2003. Policies and Market Factors Driving Wind Power Development in the United States. NREL/TP-620-34599. NREL. July.	http://www.nrel.gov/docs/fy03osti/34599.pdf
CEC. 2003. CEC. Public Interest Energy Strategies Report. Final Commission Report. Publication #100-03-012F. November.	http://www.energy.ca.gov/reports/100-03-012F.pdf
CEC. 2005. CEC. August. Funding and Energy Savings From Investor-Owned Utility Energy Efficiency Programs In California for Program Years 2000 Through 2004.	http://www.energy.ca.gov/2005publications/CEC-400-2005-042/CEC-400-2005-042-REV.pdf
CPUC. 2004. Order Instituting Rulemaking to Examine the Commission's Future Energy Efficiency Projects, Administration and Programs, September 23, 2004, Decision 04-09-060, Rulemaking 01-08-028. "Interim Opinion: Energy Savings Goals for Program Year 2006 and Beyond." CPUC.	http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/40212.htm
EIA. 2004. Annual Energy Outlook 2004. DOE-EIA-0383(2004). U.S. Energy Information Administration, Washington, D.C., January.	http://www.eia.doe.gov/oiaf/archive/aeo04/index.html
EIA. 2005a. Annual Energy Outlook 2005. DOE/EIA-0383(2005). U.S. Energy Information Administration (EIA), Washington, D.C. February.	http://www.eia.doe.gov/oiaf/archive/aeo05/index.html
EIA. 2005b. Electric Power Monthly, Data for May 2005. Table 5.6.A. Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State, April 2005 and 2004. EIA, Washington, D.C.	http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_a.html
Environment Northeast. 2005. Environment Northeast. Energy Efficiency Potential: Energy Conservation Management Board, Maximum Achievable Potential Report Summary Information. Energy Efficiency Standards, Environment Northeast, Rockport, ME.	http://www.env-ne.org/Publications/Potential%20Energy%20Conservation%20Available%20to%20CT.pdf
EPA. 2004. Output-Based Regulations: A Handbook for Air Regulators. EPA. April 22, 2004.	http://www.epa.gov/chp/pdf/output_rpt.pdf
EPA. 2005a. Air Data Web site. 2005 data. EPA. Accessed November 2005.	http://www.epa.gov/air/data/index.html and http://www.epa.gov/air/data/nonat.html?us~usa~United%20States
EPA. 2005b. Health and Environmental Impacts of Ground-Level Ozone. July. EPA.	http://epa.gov/air/urbanair/ozone/hlth.html
Evans, P.B. 2005. Optimal Portfolio Methodology for Assessing Distributed Energy Resources Benefits for the Energynet. CEC-500-2005-061-D. CEC, PIER Energy-Related Environmental Research.	http://www.energy.ca.gov/2005publications/CEC-500-2005-061/CEC-500-2005-061-D.pdf
Geller, H., C. Mitchell, and J. Schlegel. Nevada Energy Efficiency Strategy, January 2005. Southwest Energy Efficiency Project (SWEEP).	http://www.swenergy.org/pubs/Nevada_Energy_Efficiency_Strategy.pdf

References *(continued)*

Title/Description	URL Address
Kaiser, Jocelyn. 2005. Science, "Mounting Evidence Indicts Fine-Particle Pollution," Science. March 25, 2005, Vol. 307.	http://www.sciencemag.org
Minnesota Chamber of Commerce. No date given. Developing Fuels to Benefit Minnesota's Environment and Economy.	http://www.state.mn.us/mn/externalDocs/Commerce/Clean_Fuels_110802014604_RenewableAFV2003.pdf
Nadel, S. and H. Geller. 2001. Smart Energy Policies: Saving Money and Reducing Pollutant Emissions through Greater Energy Efficiency. Report #E012. ACEEE, Washington, D.C. September.	http://www.aceee.org/pubs/e012full.pdf
Nadel, S., A. Shipley, and R.N. Elliott. 2004. The Technical, Economic and Achievable Potential for Energy-Efficiency in the U.S.-A Meta-Analysis of Recent Studies. ACEEE, Washington, D.C. From the proceedings of the 2004 ACEEE Summer Study on Energy Efficiency in Buildings.	http://www.aceee.org/conf/04ss/rnemeta.pdf
Navigant. 2003. The Changing Face of Renewable Energy. Navigant Consulting Inc. October.	URL not available.
NEDRI. 2003. Dimensions of Demand Response: Capturing Customer Based Resources in New England's Power Systems and Markets. Report and Recommendations of the New England Demand Response Initiative (NEDRI). July 23.	http://nedri.raabassociates.org/Articles/FinalNEDRIREPORTAug%2027.doc
Rabe, B.G. 2004. Statehouse and Greenhouse: the Emerging Politics of American Climate Change Policy. Brookings Institution Press, Washington, D.C.	http://www.brookings.edu
Rufo, M. and F. Coito. California's Secret Energy Surplus: The Potential for Energy Efficiency. The Hewlett Foundation Energy Series, The Energy Foundation and The Hewlett Foundation, September 23, 2002.	http://www.ef.org/documents/Secret_Surplus.pdf
Schlegel, J. 2004. Conservation and Energy Efficiency: Recent Performance, Future Potential. Study conducted for the Connecticut Conservation Management Board. PowerPoint presentation. December 2.	http://www.easternct.edu/depts/sustainenergy/Upcoming%20events/CT%20Energy%20Future/Presentations/SchlegelC&LM_CTEnergyFuturesDec04f.ppt
SWEEP. November 2002. The New Mother Lode: the Potential for More Efficient Electricity Use in the Southwest. Report for the Hewlett Foundation Energy Series.	http://www.swenergy.org/nml
WGA. 2005. The Potential for More Efficient Electricity Use in the Western U.S.: Energy Efficiency Task Force Draft Report to the Clean and Diversified Energy Advisory Committee of the Western Governor's Association, Draft Report for Peer Review and Public Comment. WGA. September 15, 2005.	http://www.westgov.org/wga/initiatives/cdeac/Energyefficiencydraft9-15.pdf
Wiser, R. 2005. An Overview of Policies Driving Wind Power Development in the West. Ernest Orlando Lawrence Berkeley National Laboratory (LBNL), Berkeley, CA. February.	http://www.nationalwind.org/events/transmission/western/2005/presentations/Wiser.pdf
Wiser, R., M. Bolinger, and M. St. Clair. 2005. Easing the Natural Gas Crisis: Reducing Natural Gas Prices through Increased Deployment of Renewable Energy and Energy Efficiency. LBNL-56756. LBNL, University of California, Berkeley. January.	http://eetd.lbl.gov/EA/EMP/reports/56756.pdf
Wiser, R., K. Porter, and R. Grace. 2004. Evaluating Experience with Renewables Portfolio Standards in the United States. LGNL-54439. LBNL, University of California, Berkeley.	http://eetd.lbl.gov/ea/ems/reports/54439.pdf
York, D. and M. Kushler. 2005. ACEEE's 3rd National Scorecard on Utility and Public Benefits Programs: A National Review and Update of State-Level Activity. Report No. U054. ACEEE, Washington D.C. October.	http://www.aceee.org/pubs/u054.htm